



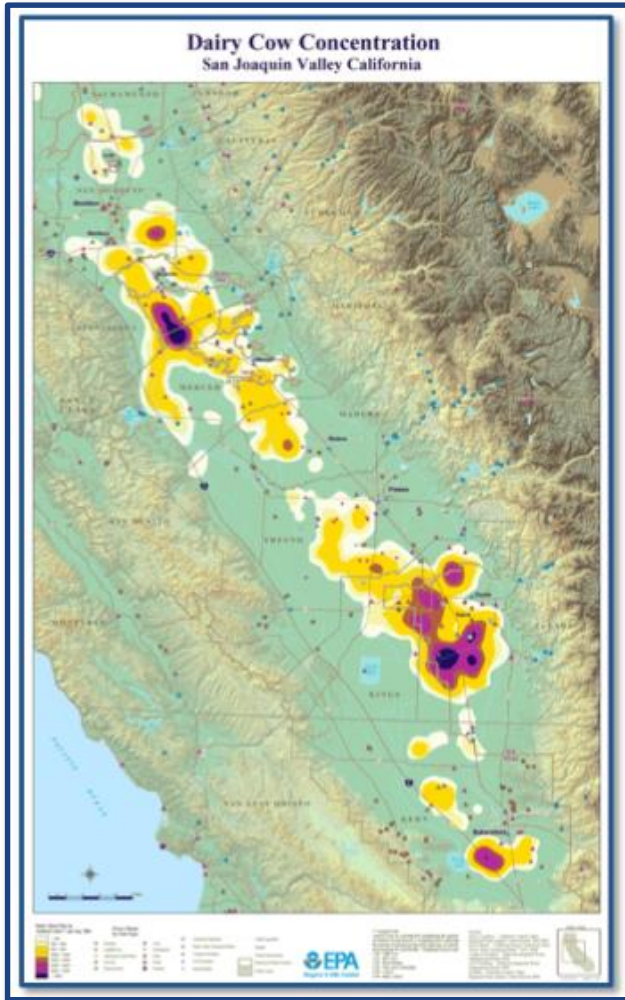
CALIFORNIA BIOENERGY

Plugging dairies into a renewable future



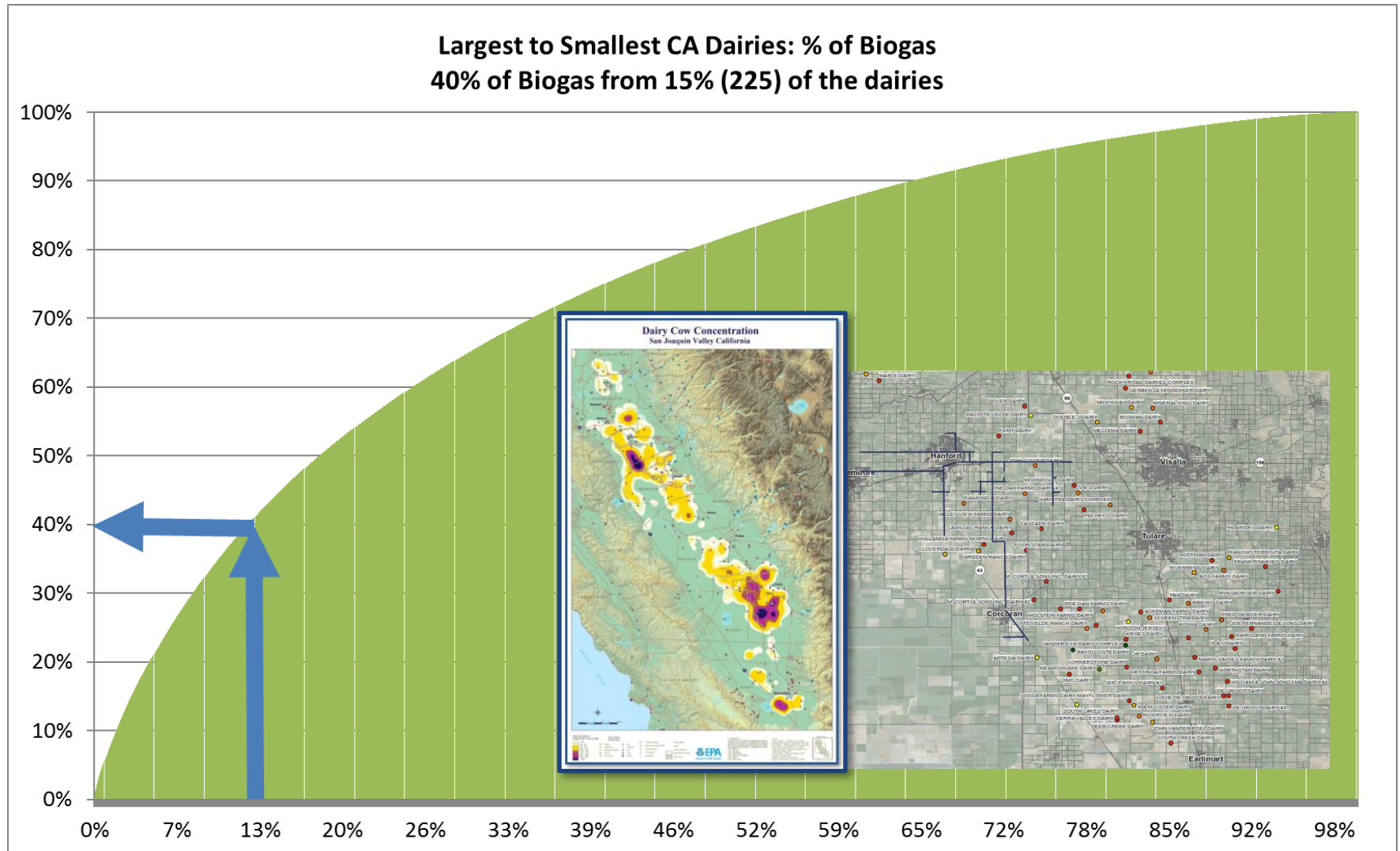


California Dairy Industry Key Statistics



Dairy Methane Heat Map

- Dairy is important! CA's #1 crop
 - \$7+ billion per year in farm sales
 - 1.7M milk cows, 1,400 dairies
- Methane "dairy by-product" = 50% of CA's total methane emissions, of which half from manure mgt.
- If captured, dairy manure methane:
 - 350 MW base load (850 MW peaking)
 - 170M diesel gallon equivalents of fuel
- Dairy biogas capture important:
 - SB 1383: 40% less methane x 2030
 - 10% less fuel carbon intensity x 2020





Old River Dairy Biogas - 4 Yrs Non Stop



Old River Dairy

The largest dairy digester in California and the first project built in a cluster of dairies outside of Bakersfield in Kern County. It began delivering commercial electricity in 2013 and has operated flawlessly over the past 4 years delivering reliable base load renewable power.



QUICK FACTS

- 2 MW of community scale, renewable electricity capacity
- Generation ~12,000 MWh per year
- Largest dairy digester in California
- Currently permitting co-digestates
- Future contribution to R-CNG transportation fuel



Dairy GHGs are More Cost Effective*

Program	Cost Per Ton ^a
Organics and recycling loans	\$4
Forest health	4
Dairy digester research and development program	8
Organics composting/digestion grants	9
Forest legacy	10
Recycling manufacturing	15
Delta and coastal wetlands restoration	30
State water and efficiency and enhancement program	33
Clean vehicle rebates	46
Sustainable agricultural lands conservation	59
Mountain meadow ecosystems restoration	113
Urban and community forestry	116
Water-energy grant program	141
Affordable housing and sustainable communities	191
Single-family solar photovoltaics ^b	209
Transit and intercity rail capital	259
Single-family energy efficiency and solar water heating ^b	282
Large multifamily energy efficiency and renewables ^b	343
Enhanced fleet modernization program "plus-up"	414
Truck and bus voucher incentives	452
Incentives for public fleets pilot project for DACs	725
Overall Average	\$57



Separator, sand lane, octagon, digester





Double-lined digester





Co-Digestion ready – WSN in construction





Inflated digester with storage



Thank you to CDFA, CEC and Utilities for Your Support



Electricity versus Fuel (CNG)



Electricity

1. Good Price:
\$20/MMBTU incl. credits
2. Bank financeable:
20 Year BioMAT PPAs
3. Some extra emissions:
NOx from exhaust



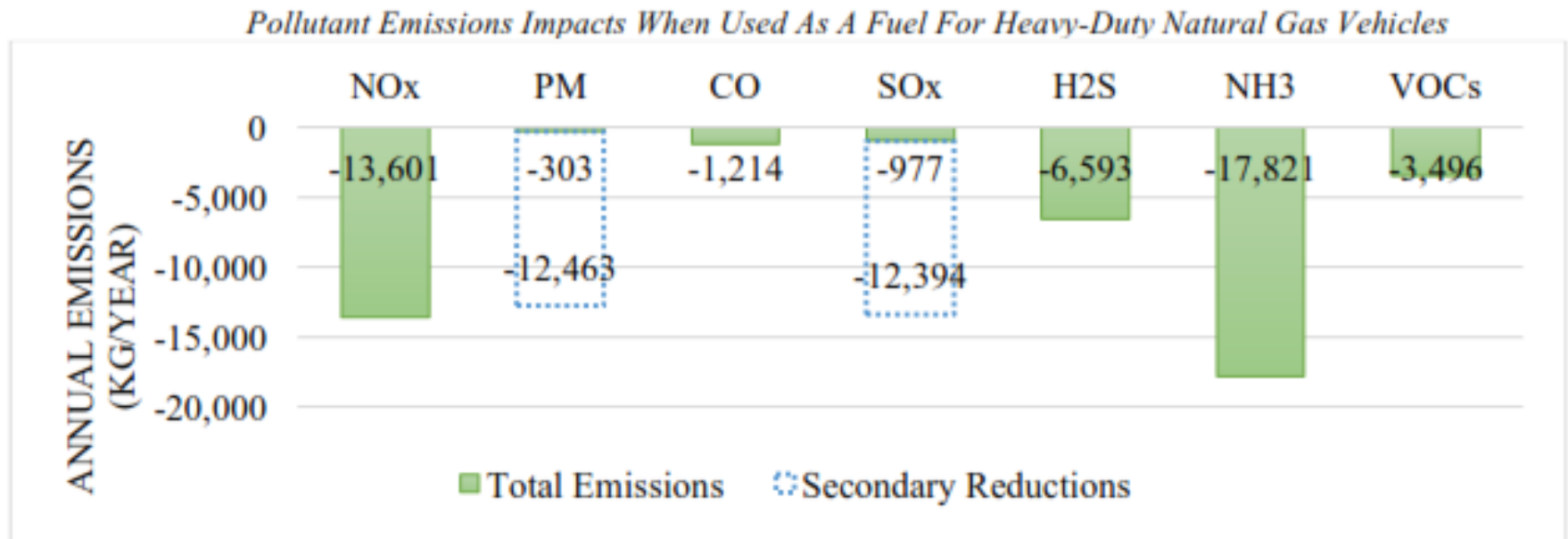
Fuel (RNG)

1. Great Price:
\$40-60/MMBTU (LCFS & RINs)
2. Not bank financeable:
Market based volatile pricing
3. Significant Environ. Benefits:
NOx and pollution reductions



Dairy Biomethane Fuel Pollution Benefits

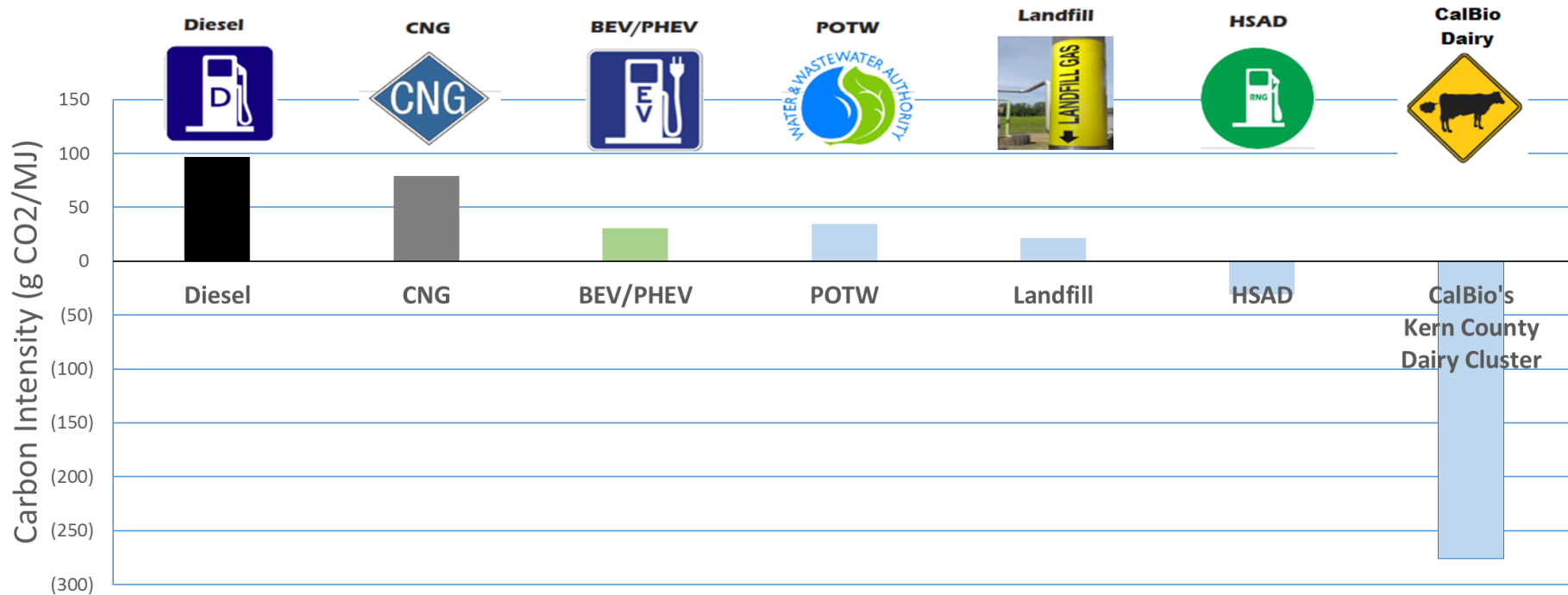
Pollution benefits from one dairy digester RNG project installed on a large CA dairy (5,000 milk cows)





Dairy Biomethane Fuel Carbon Intensity

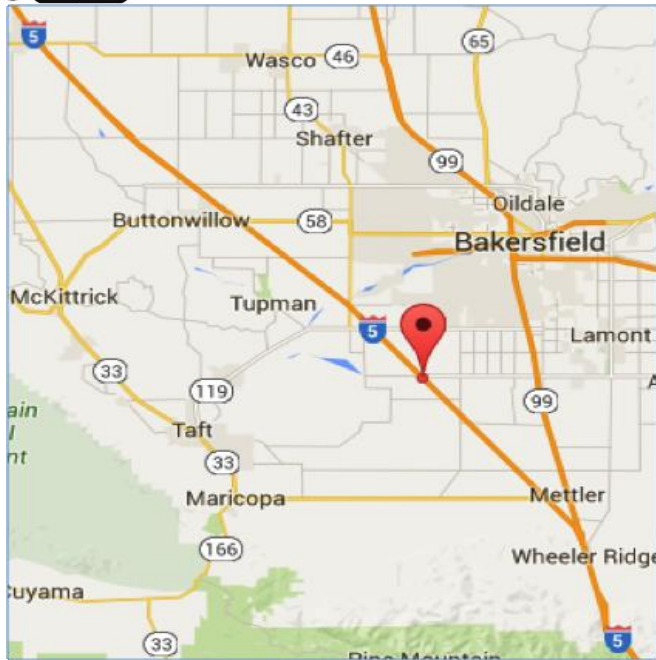
Carbon Intensity for Diesel & Substitute Fuels
(g CO₂/MJ)



* California Bioenergy LLC: California Dairy Digester Biogas to CNG GREET 2.0, LCFS FP: CNG056, CI: -276.24



Kern Co Cluster – Sustainable Freight Plan



- Kern County, near Bakersfield
- Adjacent to I-5 near Highway 99
- Composed of 16 modern dairies
- Approximately 50,000 milkers, 100,000 cows
- SoCal Gas and PG&E pipelines
- 1B SCF/Yr of Biogas or 3 MM DGE potential





Cluster Map

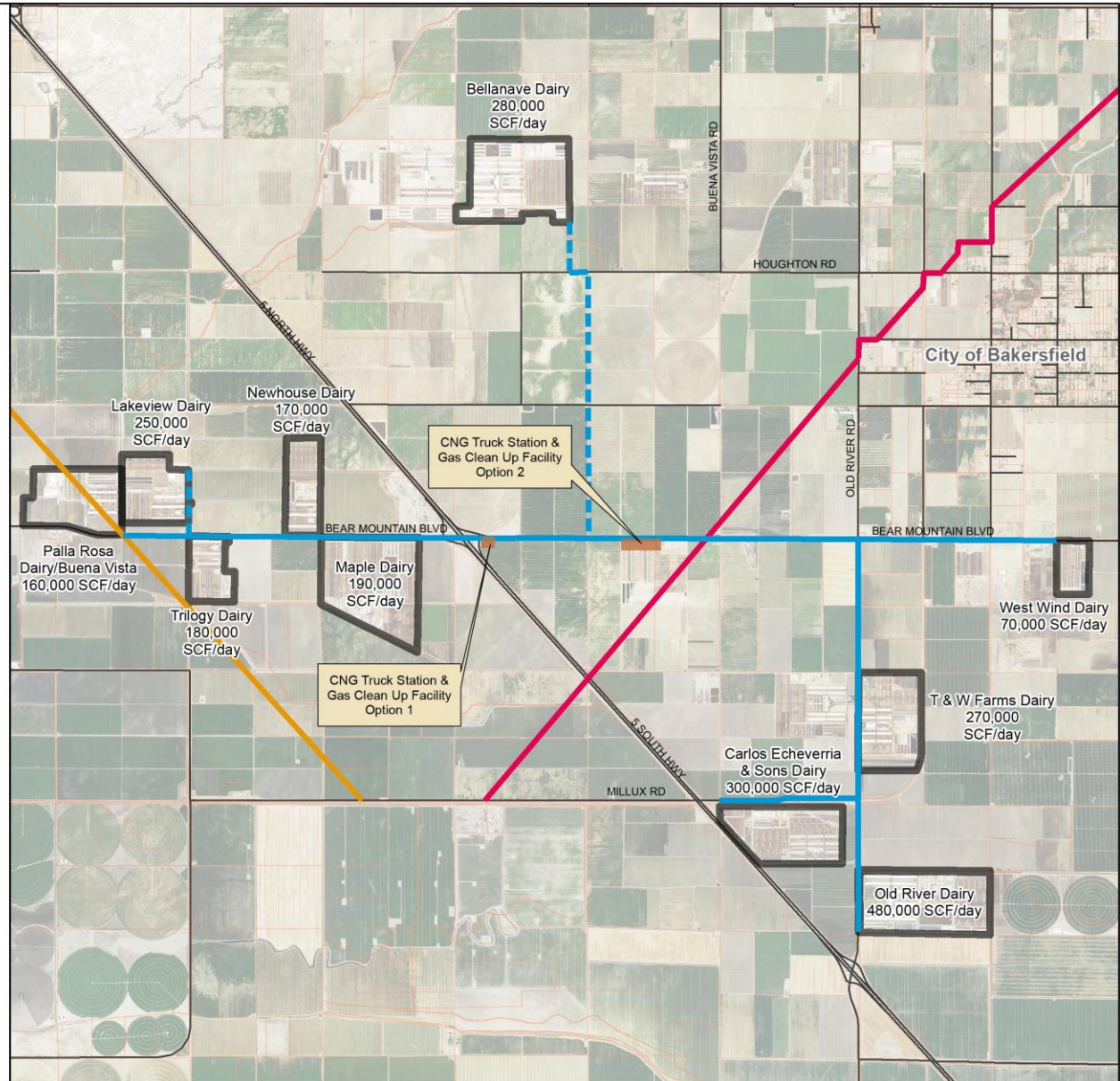
California Bioenergy Dairy and Pipeline Map

Legend

- Dairy Outline
- CNG Truck Station Site
- City Boundary
- Parcels
- Bio-Gas Pipeline - No R/W (15,268 ft)
- Bio-Gas Pipeline in R/W (59,155 ft)
- Socal Gas >200psi Line (Approx)
- PG&E Gas Line
- Roads



1 inch = 1 mile





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